

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims:

Claim 1 (Currently Amended): A method comprising:

performing autodiscovery to discover peer devices using a first routing protocol between a first device associated with a first customer network and a second device associated with a second customer network;

based on the autodiscovery, establishing a peering session between the first device and the second device using the first routing protocol;

establishing a label switched path (LSP) through a plurality of intermediate networks communicatively coupled between [[a]] the first customer network and [[a]] the second customer network;

after performing autodiscovery and establishing the peering session and the LSP, communicating layer two (L2) service information over the peering session using [[a]] the first routing protocol between [[a]] the first device associated with the first customer network and [[a]] the second device associated with the second customer network, wherein communicating the L2 service information using the first routing protocol comprises the first device outputting a routing communication in accordance with the first routing protocol, wherein the routing communication includes the L2 service information, and wherein the L2 service information comprises Media Access Control (MAC) address state information for devices in the first customer network; and

providing an L2 service in accordance with the L2 service information to transport L2 communications between the first customer network and the second customer network through the plurality of intermediate networks using the LSP, wherein at least one of the plurality of intermediate networks does not support the L2 service.

Claim 2 (Previously Presented): The method of claim 1, wherein establishing an LSP comprises exchanging label information associated with the LSP between the plurality of intermediate networks using a second routing protocol that has been extended to distribute the label information.

Claim 3 (Original): The method of claim 2, wherein the second routing protocol carries the label information in association with routes advertised between the intermediate networks.

Claim 4 (Original): The method of claim 2, wherein the second routing protocol carries the label information as network layer reachability information (NLRI) that is associated with a route advertised between the first customer network and the second customer network.

Claim 5 (Original): The method of claim 2, wherein the second routing protocol comprises the Border Gateway Protocol (BGP).

Claim 6 (Original): The method of claim 2, wherein the label information conforms to one of Multi-protocol Label Switching (MPLS) or the Label Distribution Protocol (LDP).

Claim 7 (Original): The method of claim 2, wherein the first routing protocol is the same as the second routing protocol.

Claim 8 (Currently Amended): The method of claim 1, wherein communicating the L2 service information using a first routing protocol comprises communicating the L2 service information between the first device and the second device using an exterior routing protocol.

Claim 9 (Original): The method of claim 8,

wherein communicating L2 service information comprises communicating the L2 service information using an intermediate route relay device,

wherein the L2 service information includes information for L2 sites or end-points within the second customer network and next hop information used to reach these L2 sites or end-points from the first customer network, and

wherein the method includes configuring the intermediate route relay device to maintain and relay the next hop information unchanged via the exterior routing protocol.

Claim 10 (Currently Amended): The method of claim 1, wherein the L2 service comprises the Virtual Private LAN Service and the L2 communications comprise Ethernet communications, and wherein at least one of the plurality of intermediate networks does not support the Virtual Private LAN Service.

Claim 11 (Currently Amended): The method of claim 2 [[1]], wherein providing an L2 service comprises:

receiving L2 communications from the first customer network; and

assigning labels to the L2 communications from the first customer network in accordance with the label information to form packets for transporting the L2 communications from the first customer network to the second customer network.

Claim 12 (Currently Amended): A device comprising:

one or more interface cards configured to communicate packets via input links and output links;

a routing process that receives label information for a label switched path (LSP) through a plurality of intermediate networks communicatively coupled between a first customer network and a second customer network, wherein the routing process receives the label information from packets received by the one or more interface cards; and

a first routing protocol that performs autodiscovery to discover a second device associated with the second customer network, establishes a peering session between the device and the second device based on the autodiscovery, and receives layer two (L2) service information associated with the second customer network by receiving a routing communication over the peering session that includes the L2 service information, wherein the L2 service information comprises Media Access Control (MAC) address state information for devices in the first customer network; and

an L2 service that operates in accordance with the L2 service information and transports L2 communications between the first customer network and the second customer network through the plurality of intermediate networks in accordance with the label information by outputting the L2 communications via the output links of the one or more interface cards, wherein at least one of the plurality of intermediate networks does not support the L2 service.

Claim 13 (Previously Presented): The device of claim 12, wherein the routing process receives the label information through the plurality of intermediate networks via a second routing protocol that has been extended to distribute the label information.

Claim 14 (Previously Presented): The device of claim 13, wherein the second routing protocol carries the label information in association with routes advertised between the plurality of intermediate networks.

Claim 15 (Original): The device of claim 13, wherein the second routing protocol carries the label information as network layer reachability information (NLRI) that is associated with a route advertised between the first customer network and the second customer network.

Claim 16 (Original): The device of claim 13, wherein the second routing protocol comprises the Border Gateway Protocol (BGP).

Claim 17 (Previously Presented): The device of claim 13, wherein the first routing protocol is the same as the second routing protocol.

Claim 18 (Original): The device of claim 12, wherein the label information conforms to one of Multi-protocol Label Switching (MPLS) or the Label Distribution Protocol (LDP).

Claim 19 (Currently Amended): The device of claim 12, wherein the device receives the L2 service information from [[a]] the second device associated with the second customer network via an exterior routing protocol.

Claim 20 (Original): The device of claim 19,
wherein the L2 service information includes information for L2 sites or end-points in the second customer network and next hop information used by the device to reach these remote L2 sites or end-points, and
wherein the device is configured relay the next hop information unchanged using the exterior routing protocol when the device receives the L2 service information and the next hop information via an intermediate route relay device.

Claim 21 (Currently Amended): The device of claim 12, wherein the L2 service comprises the Virtual Private LAN service (VPLS) and the L2 communication comprise Ethernet communications and wherein at least one of the plurality of intermediate networks does not support the Virtual Private LAN Service.

Claim 22 (Previously Presented): The device of claim 12, wherein the L2 service receives L2 communications from the first customer network, and assigns labels to the L2 communications from the first customer network in accordance with the label information to form packets for transporting the L2 communications from the first customer network to the second customer network through the plurality of intermediate networks via the LSP.

Claim 23 (Original): The device of claim 12, wherein the device comprises a provider edge router or a customer edge router.

Claim 24 (Currently Amended): A system comprising:
a border router that establishes a label switched path (LSP) through a plurality of intermediate networks, wherein the LSP communicatively couples a first customer network and a second customer network;

a first route reflector associated with the first customer network that performs autodiscovery between the first route reflector and a second route reflector associated with a second customer network to discover peer devices using an exterior routing protocol, and, based on the autodiscovery, establishes a peering session between the first route reflector and the second route reflector using the exterior routing protocol, and communicates layer two (L2) service information with [[a]] the second route reflector associated with the second customer network via routing communications that conform to an the exterior routing protocol, wherein the routing communications include the L2 service information, and wherein the L2 service information comprises Media Access Control (MAC) address state information for devices in the first customer network; and

an edge router that provides an L2 service to the first customer network in accordance with the L2 service information to transport L2 communications between the first customer network and the second customer network through the plurality of intermediate networks using the LSP, wherein at least one of the plurality of intermediate networks does not support the L2 service.

Claim 25 (Previously Presented): The system of claim 24, wherein the border router establishes the LSP by exchanging label information associated with the LSP between the plurality of intermediate networks using a routing protocol.

Claim 26 (Original): The system of claim 25, wherein the routing protocol has been redefined to carry the label information in association with routes advertised between the intermediate networks.

Claim 27 (Original): The system of claim 25, wherein the routing protocol has been redefined to carry the label information as network layer reachability information (NLRI) that is associated with a route advertised between the first customer network and the second customer network.

Claim 28 (Original): The system of claim 25, wherein the routing protocol comprises the Border Gateway Protocol (BGP).

Claim 29 (Original): The system of claim 25, wherein the label information conforms to one of Multi-protocol Label Switching (MPLS) or the Label Distribution Protocol (LDP).

Claim 30 {Canceled}

Claim 31 (Previously Presented): The system of claim 24,
wherein the L2 service information specifies one or more L2 sites or end-points in the second customer network and includes next hop information used to reach these L2 sites or end-points from the first customer network, and
wherein the first and second route reflectors are configured to maintain and relay the next hop information unchanged upon receiving the next hop information via the exterior routing protocol.

Claim 32 (Currently Amended): The system of claim 24, wherein the edge router provides an L2 service that comprises the Virtual Private LAN Service to transport the L2 communications that comprise Ethernet communications and wherein at least one of the plurality of intermediate networks does not support the Virtual Private LAN Service.

Claim 33 (Previously Presented): The system of claim 24, wherein the edge router provides an L2 service by receiving L2 communications from the first customer network, and assigning labels to the L2 communications from the first customer network in accordance with the label information to form packets for transporting the L2 communications from the first customer network to the second customer network through the plurality of intermediate networks via the LSP.

Claim 34 (Currently Amended): A computer-readable medium comprising instructions to cause a processor to:

execute a routing process that receives label information for a label switched path (LSP) through a plurality of intermediate networks communicatively coupled between a first customer network and a second customer network, wherein the L2 service information is received using the ~~first~~ routing ~~process~~ ~~protocol~~ by receiving a routing communication that conforms to a first routing protocol and that includes the L2 service information; and

execute a layer two (L2) service that receives L2 service information associated with the second customer network using a first routing protocol, wherein at least one of the plurality of intermediate networks does not support the L2 service, and wherein the L2 service information comprises Media Access Control (MAC) address state information for devices in the second customer network; and

transport ~~transports~~ L2 communications between the first customer network and the second customer network through the plurality of intermediate networks, wherein at least one of the plurality of intermediate networks does not support the L2 service in accordance with the label MAC address state information using the LSP to emulate L2 connectivity across the intermediate networks.

Claim 35 (Currently Amended): The computer-readable medium of claim 34,
wherein the routing process receives the label information through the plurality of
intermediate networks via a second routing protocol, and
wherein the second routing protocol carries the label information in association with
routes advertised between the plurality of ~~one or more~~ intermediate networks.

Claim 36 (Original): The computer-readable medium of claim 35, wherein the second routing
protocol comprises the Border Gateway Protocol (BGP).

Claim 37 (Original): The computer-readable medium of claim 35, wherein the first routing
protocol is the same as the second routing protocol.

Claim 38 (Previously Presented): The method of claim 1, further comprising processing the
L2 service information with the second device using the first routing protocol by injecting the L2
service information into stored route information and resolving the route information to associate
routes associated with the injected L2 service information with respective next-hops.

Claim 39 (New): The method of claim 1, wherein outputting the routing communication
that includes the L2 service information comprising MAC address state information comprises
continuously outputting routing communications that include L2 service information comprising
MAC address state information for devices in the first customer network as the MAC address
state information is learned by the first device.

Claim 40 (New): A system comprising:

a border router that establishes a label switched path (LSP) through a plurality of intermediate networks, wherein the LSP communicatively couples a first customer network and a second customer network;

a first route reflector associated with the first customer network that performs autodiscovery between the first route reflector associated with the first customer network and a second route reflector associated with a second customer network to discover peer devices using an Exterior Border Gateway Protocol (EBGP), and, based on the autodiscovery, establishes an EBGP peering session between the first route reflector and the second route reflector using the EBGP, and communicates layer two (L2) service information with the second route reflector associated with the second customer network as the L2 service information is learned by continuously outputting EBGP routing communications that include the L2 service information, and wherein the L2 service information comprises Media Access Control (MAC) address state information for devices in the first customer network; and

an edge router that provides a Virtual Private LAN Service to the first customer network in accordance with the L2 service information to emulate L2 connectivity by transporting Ethernet communications between the first customer network and the second customer network through the plurality of intermediate networks using the LSP, wherein the plurality of intermediate networks do not support the Virtual Private LAN Service.